Introduction to Enzymes
Review Macromolecules

- Proteins $\rightarrow$ amino acids
- Carbohydrates $\rightarrow$ sugars
  - (monosaccharides, polysaccharides, glucose)
- Lipids $\rightarrow$ fatty acids and a glycerol
- Nucleotides $\rightarrow$ nucleic acids
Proteins

- Chains of amino acids
- Many proteins are enzymes
- Enzymes catalyze chemical reactions
Enzymes as catalysts

- Catalyst - Speeds up chemical reactions in living organisms by decreasing the energy needed to start the reaction (activation energy)
Definitions

• **Substrate** - monomers that bind to the active site of an enzyme

• **Active site** - area on enzyme where substrate binds

• **Product** - what the enzyme produces
Lock and Key Model

Two substrates

Enzyme

Active site of the enzyme
The substrates fit like a key in a lock.

The active site is like a lock.
The activation energy for these substrates to bind together has been lowered by the enzyme.
Basic Enzyme Diagram

The substrates have reacted and changed into the product

Active site

Enzyme is unchanged
In Biology when a word ends in –ase it is more than likely it’s an enzyme.

Guess what polymers are broken down by these enzymes and what monomers are created?

<table>
<thead>
<tr>
<th>Polymer</th>
<th>Monomer</th>
</tr>
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<tbody>
<tr>
<td>Protease</td>
<td>__________</td>
</tr>
<tr>
<td>Sucrase</td>
<td>__________</td>
</tr>
<tr>
<td>Lipase</td>
<td>__________</td>
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Enzymes are very complex structures whose shapes and functions can be affected by many factors.
What factors affect enzyme function?

- pH
- Temperature
Graphing enzyme activity

Enzyme activity

Temperature (°C)

Increasing activity

Optimum

Denaturation: enzyme is ruined

20 30 40 50 60
The optimal temperature for this enzyme is _______